Analysis of Frequency Reuse Techniques in LTE Network

Sandeep Jain
Department of Electrical Engineering
Vivekananda Global University, Jaipur
Email ID:sandeep_jain@vgu.ac.in

ABSTRACT: ***Frequency Reuse Techniques are needed to fulfill the outstanding increment of information requests in versatile net-works, for example, the Long Term Evolution (LTE) organization of Universal Mobile Terrestrial radio access System (UMTS). Be that as it may, the concurrent use of a similar Frequency in neighboring LTE cells that makes between cell obstruction issues at cell-edge clients. Between Cell Interference Coordination (ICIC) methods are sent to dodge the negative impact of obstruction on framework execution. This examination arranged the current ICIC methods and explores the presentation of reuse-1, reuse-3 plans under different client circulations. Execution of cell-focus and cell-edge clients is examined, just as the generally speaking phantom effectiveness, throughput and organization load. Framework level reenactments are played out that shows the points of interest and constraints of each of the inspected strategies under various client circulations which is utilized to decide the most reasonable ICIC procedure to be utilized.***

KEYWORDS: LTE, Pulse, Communication, Modulation, Demodulation.

INTRODUCTION

LTE (Long Term Evolution):

Long haul Evolution is huge task characterized by third Generation Partnership Project (3GPP) in Toronto gathering of 3GPP in 2004 and formally began as LTE work thing in 2006. LTE is the cutting edge 4G innovation for both GSM (Worldwide framework for portable correspondence) and CDMA (Code division different access) cell organizations. LTE as change from 3G has accomplished incredible limit and fast when contrasted with the past age cell networks. Subsequently LTE needs to fulfill a bunch of significant level prerequisites as follows[1]:

1. Reduced cost per bit

2. Simple architecture and open interfaces

3. Flexibility usage of existed and future frequency bands

4. Reasonable terminal power

5. Enhanced user experience-more services with lower cost and high speed[2].

LTE innovation is significant on the grounds that it will raise to multiple times execution improvement and much better ghastly productivity to cell organizations. It is an ideal innovation to help high date rates for the administrations like voice over IP (VOIP), videoconferencing. It utilizes both Time Division Duplex (TDD) and Frequency Division Duplex (FDD) mode[3].

Frequency Reuse:

In remote correspondence, every cell has its own transmitter (Base Stations) and a gathering of channels. Ordinarily these channels are 8 to 10 directs in which a few channels are utilized for voice control and some for information control. Thusly, if in a city there are 100 base stations then a comparing number of channels goes to 1000s yet a fixed range has been designated by the TRAI (Telecom Regulatory Authority of India). On the off chance that each channel has its own recurrence transfer speed, at that point the range will go to in gigabytes. That is outside the ability to control TRAI. In this manner need to discover an answer to deal with these channels. The arrangement is recurrence Reuse or Frequency Planning[4].

Problem:

Lately, two significant difficulties for advancing LTE organizations:

• How to accomplish upgraded framework limit.

• How to improve cell inclusion territory.

To improve the limit and cell inclusion, recurrence reuse strategies are utilized. In any case, these methods experience the ill effects of between cell the impedance at cell limit when the total recurrence is reused. So for settling the between cell impedance issue we will executes these recurrence reuse strategies and plays out their exhibition investigation[5].

Objectives:

From the literature review it is concluded that Frequency Reuse Techniques have been studied by various researchers and there is lot of scope for research in this area. Therefore objectives for our Research are:

• To study the Frequency Reuse Techniques[6].

• Implementation of Frequency Reuse Techniques using LTE-Sim. • Performance comparison of Frequency Reuse Techniques.

REVIEW OF LITERATURE

There have been many paper published in the field offrequency reuse technique in LTE systems among all papers a paper titled **"**Analysis of Frequency Reuse Techniques in LTE Network" by Seema 1st and Ashok 2nd discusses about the Long Term Evolution is significant project defined by 3rd Generation Partnership Project (3GPP) in Toronto conference of 3GPP in 2004 and officially started as LTE work item in 2006[1]. LTE is the next generation 4G technology for both GSM (Global system for mobile communication) and CDMA (Code division multiple access) cellular networks. LTE as transition from 3G has achieved great capacity and high speed as compared to the previous generation cellular networks, Frequency Reuse Techniques are needed to fulfill the outstanding increment of information requests in versatile net-works, for example, the Long Term Evolution (LTE) organization of Universal Mobile Terrestrial radio access System (UMTS). Be that as it may, the concurrent use of a similar Frequency in neighboring LTE cells that makes between cell obstruction issues at cell-edge clients. Between Cell Interference Coordination (ICIC) methods are sent to dodge the negative impact of obstruction on framework execution. This examination arranged the current ICIC methods and explores the presentation of reuse-1, reuse-3 plans under different client circulations. Execution of cell-focus and cell-edge clients is examined, just as the generally speaking phantom effectiveness, throughput and organization load. Framework level reenactments are played out that shows the points of interest and constraints of each of the inspected strategies under various client circulations which is utilized to decide the most reasonable ICIC procedure to be utilized[7].

CONCLUSION

Recurrence Reuse Techniques are actualized in LTE test system and their near investigation is completed based on the various boundaries like Throughput, Spectral Efficiency, Network load and so on Recurrence reuse one and Improved Recurrence reuse three calculations are executed in the LTE test system. At that point, the recurrence scheduler is chipped away at these two calculations and their exhibition is assessed dependent on these boundaries. Performance of these methods is explored through a few boundaries like Spectral Efficiency, Throughput and Organization Load. Recurrence Reuse 1 shows higher Spectral Efficiency when contrasted with Frequency Reuse 3. For the situation of Network load, Frequency Reuse 3 works better when the quantity of clients is less. As the number of clients expands, the Network load on Frequency Reuse 3 builds that are bad. Throughput of both Frequency Reuse 1 what's more, Frequency Reuse 3 is dissected on the base of the Cumulative Distribution Function. This capacity accomplishes the most extreme throughput on account of Frequency Reuse 3 as a contrast with Reuse 1. Consequences of execution presumed that Improved Frequency reuse three are superior to Frequency reuse three in phantom productivity, obstruction commotion proportion, network burden, and throughput. After computing the presentation rate, obviously the exhibition of Improved Frequency Reuse Three is expanded by roughly 4-

5% when contrasted with the Frequency Reuse Three dependent on various boundaries. This shows improved execution over Reuse three calculation

REFERENCES

[1] E. Dahlman, S. Parkvall, and J. Skold, *4G: LTE/LTE-Advanced for Mobile Broadband*. 2013.

[2] J. Sachs, G. Wikstrom, T. Dudda, R. Baldemair, and K. Kittichokechai, "5G Radio Network Design for Ultra-Reliable Low-Latency Communication," *IEEE Netw.*, 2018, doi: 10.1109/MNET.2018.1700232.

[3] A. Khandekar, N. Bhushan, J. Tingfang, and V. Vanghi, "LTE-advanced: Heterogeneous networks," 2010, doi: 10.1109/EW.2010.5483516.

[4] A. Damnjanovic *et al.*, "A survey on 3GPP heterogeneous networks," *IEEE Wirel. Commun.*, 2011, doi: 10.1109/MWC.2011.5876496.

[5] Y. Zaki and Y. Zaki, "LTE Network Simulator," in *Future Mobile Communications*, 2013.

[6] B. Bangerter, S. Talwar, R. Arefi, and K. Stewart, "Networks and devices for the 5G era," *IEEE Commun. Mag.*, 2014, doi: 10.1109/MCOM.2014.6736748.

[7] S. Palat and P. Godin, "Network Architecture," in *LTE - The UMTS Long Term Evolution: From Theory to Practice*, 2009.

- P. Lavanya, R. Meena, R. Vijayalakshmi, Prof. M. Sowmiya, Prof. S. Balamurugan , " A Novel Object Oriented Perspective Design for Automated BookBank Management System", International Journal of Innovative Research in Computer and Communication Engineering, Vol.3, Issue 2, February 2015.
- P.Andrew , J.Anishkumar , Prof.S.Balamurugan , S.Charanyaa, " A Survey on Strategies Developed for Mining Functional Dependencies", International Journal of Innovative Research in Computer and Communication Engineering, Vol.3, Issue 2, February 2015.
- SV AmridhVarshini, R Kaarthi, N Monica, M Sowmiya, S Balamurugan, "Entity Relationship Modeling of Automated Passport Management System", International Journal of Innovative Research in Science, Engineering and Technology , Vol. 4, Issue 2, February 2015
- Kavita Arora, Dr. Kavita, Dr. Vishal Jain. (2020). A Study On Attacks In Mobile Ad-Hoc Networks. International Journal of Advanced Science and Technology, 29(8s), 279 - 289. Retrieved from http://sersc.org/journals/index.php/IJAST/article/view/10502
- Kavita Arora, Kavita, Vishal Jain, Impacts of Black Hole Attack on Mobile Ad-hoc Networks, International Journal of Future Generation Communication and Networking, Vol. 13, No. 4, (2020), pp. 644–653
- Gomathy, V., Padhy, N., Samanta, D. et al. Malicious node detection using heterogeneous cluster based secure routing protocol (HCBS) in wireless adhoc sensor networks. J Ambient Intell Human Comput (2020). https://doi.org/10.1007/s12652-020-01797-3.